CLAIMS

We Claim:

1. A medical infusion system comprising:

a spike member having a fluid passageway; and,

a micro-electromechanical system (MEMS) element operatively connected to the spike member.

2. The system of claim 1 wherein the MEMS element is housed within the spike.

3. The system of claim 1 wherein the spike is disposable.

4. The system of claim 1 further comprising an external controller operatively connected to the spike member for controlling the MEMS element.

5. The system of claim 1 further comprising an external controller operatively connected to the spike member for receiving information from the MEMS element.

6. The system of claim 4 wherein the controller of the MEMS element is wireless.

7. The system of claim 5 wherein the controller of the MEMS element is wireless.

8. The system of claim 4 wherein the controller of the MEMS element is reusable.

9. The system of claim 5 wherein the controller of the MEMS element is reusable.

10. The system of claim 4 wherein the controller displays fluid flow parameters.

11. The system of claim 4 wherein the controller stores fluid flow parameters.

12. The system of claim 4 further comprising a network communication link connectable to the

controller.

13. The system of claim 12 wherein the network communication link is capable of transmitting fluid flow parameters to a network of computers.

14. The system of claim 12 wherein the network communication link is capable of controlling the MEMS element remotely.

15. The system of claim 1 further comprising a power source attached to the spike and operably connected to the MEMS element.

16. The system of claim 15 wherein the power source is disposable.

17. The system of claim 1 wherein the MEMS element is selected from the group consisting of a pump, a flow valve, a flow sensor, a pressure sensor and any combination of these elements.

18. The system of claim 1 further comprising a reservoir, wherein the spike is capable of being connected to the reservoir.

19. The system of claim 18 wherein the reservoir comprises a rigid container.

20. A disposable medical line-set comprising:
a length of tubing having a first end;
a fluid extraction spike connected to the first end of the tubing; and
a MEMS pump housed within the fluid extraction spike and operatively connected to the tubing.

21. The disposable medical line-set of claim 20 wherein the spike is configured to attach to a rigid container and comprises an air intake vent member for allowing air into the rigid container proportionate to fluid removed from the rigid container.

22. The disposable medical line-set of claim 21 wherein the MEMS pump draws fluid from the rigid container through the fluid extraction spike.

23. The disposable medical line-set of claim 21 wherein the MEMS pump is configured to force air into the rigid container.

24. The disposable medical line-set of claim 20 further comprising a power source operably connected to the MEMS pump.

25. The disposable medical line-set of claim 20 wherein the spike includes a disposable power source housed within the spike.

26. The disposable medical line-set of claim 20 further comprising a reusable MEMS pump controller communicatively connected to the MEMS pump.

27. The disposable medical line-set of claim 26 wherein the reusable MEMS pump controller is wireless.

28. The disposable medical line-set of claim 20 further comprising a patient catheter connected to a second end of the disposable length of tubing.

29. The disposable medical line-set of claim 28 wherein the patient catheter is disposable.

30. The disposable medical line-set of claim 20 wherein the disposable line-set is capable of being implanted within a body.

31. The disposable medical line-set of claim 20 wherein the spike further comprises a MEMS fluid flow sensor.

32. The disposable medical line-set of claim 20 wherein the spike further comprises a MEMS fluid flow valve.

33. The disposable medical line-set of claim 20 wherein the spike further comprises a MEMS pressure sensor.

34. The disposable medical line-set of claim 26 further comprising a network communication link connectable to the controller.

35. The disposable medical line-set of claim 26 wherein the controller comprises a display for line-set parameters.

36. The disposable medical line-set of claim 26 wherein the controller comprises storage for line-set parameters.

37. A spike member for a medical infusion system comprising:

a housing having a passageway therethrough;

a piercing member connected to one end of the housing and in fluid communication with the passageway; and

a MEMS pump in communication with the passageway and contained within the housing.

38. An infusion system comprising:

a container adapted to contain a flowable substance;

a spike member comprising a passageway therethrough and in fluid communication with the container, the spike having a MEMS pump operatively connected to the spike; and

a system of tubing having one end connected to the spike and in fluid communication with the passageway and another end adapted to be connected to a patient.

39. A medical fluid extraction member comprising:

a substantially rigid body portion having first and second ends;

a first fluid passage having an opening defined at each end of the body and passing therethrough;

a second fluid passage having a first opening defined at the first end of the body and

passing a distance through the body and a second opening defined on another portion of the substantially rigid body; and

a MEMS fluid pump operatively communicating with one of either the first fluid passage and the second fluid passage.

40. The medical fluid extraction member of claim 39 further comprising a piercing member at the first end of the body.

41. The medical fluid extraction member of claim 39, wherein the second passage is an air inlet.

42. The medical fluid extraction member of claim 41, wherein the MEMS fluid pump is in operative communication with the air inlet.

43. The medical fluid extraction member of claim 41, wherein the second opening of the second passage is defined on a sidewall portion of the body.

44. The medical fluid extraction member of claim 39, wherein the MEMS fluid pump is in operative communication with the first fluid passage.

45. The medical fluid extraction member of claim 39, wherein the MEMS fluid pump is housed within the substantially rigid body.

46. The medical fluid extraction member of claim 39, wherein the MEMS fluid pump is integral to the substantially rigid body.